localize to cortically-distributed RNP granules, and are necessary to recruit other components to these complexes. We predict that the GLH-1/DCR-1 complex may function in the transport, deposition, or regulation of maternally-transcribed mRNAs and their associated miRNAs.

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Program/Abstract # 354
Regulation of motility in *C. elegans* sperm
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Cellular motility is critical for many processes, from gastrulation to organogenesis to wound healing to fertility. However, cell movement must be tightly regulated to ensure that cells only migrate when and where they should. We are using *C. elegans* sperm, which move by crawling, as a model for studying signals that induce cells to become motile and guide their directional migration. Sperm motility is acquired during a process known as activation, in which a round spermatid undergoes subcellular morphogenesis, rapidly transforming into a polarized, fully-mature spermatozoon. In a genetic screen for regulators of activation, we have identified a likely extracellular trigger, the serine protease TRY-5, as well as a number of potential targets on the sperm cell, including the SLC6 family transporter SNF-10. In other screens for sperm function, we have identified a mutant in which male sperm fail to migrate efficiently toward eggs, resulting in failure to outcompete hermaphrodite sperm; we are working to identify the affected gene. Analysis of these factors is yielding insight into how cellular motility can be modulated to achieve an important developmental event, the union of sperm and egg.

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Program/Abstract # 355
Regulation of *C. elegans* sperm motility by extracellular protease signaling
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Sperm motility is a necessary aspect of sperm function and is thus generally required for sexual reproduction. In *C. elegans*, sperm develop motility during a process termed sperm activation (or spermiogenesis), which is regulated differentially in males and hermaphrodites to ensure optimal fertility. For male sperm, activation must be triggered rapidly after sperm is transferred to a hermaphrodite; if sperm become motile within the male or activate slowly upon transfer to the hermaphrodite, fertility is greatly reduced or eliminated. A variety of evidence suggests that a male signal, which is distinct from the hermaphrodite signal, likely instructs sperm to activate after mating. We are interested in how this rapid activation is accomplished and regulated via the presumptive signal. We have identified a pair of candidate regulators, a serine protease, TRY-5, and a trypsin inhibitor-like (TIL) domain protein, SWM-1. *swm-1* mutant sperm activate within males, and TRY-5 activity is required for this premature activation. However, *try-5* mutant males are fertile, likely due to redundancy with hermaphrodite sperm activation signals. We have found that *try-5* mutant males are defective for transfer of a male activator, and preliminary evidence suggests that TRY-5 is expressed in and secreted by the vas deferens. Thus, TRY-5 is likely the seminal fluid sperm activator. We propose that during mating, TRY-5 triggers activation by cleaving sperm surface proteins, thereby coupling rapid and irreversible acquisition of motility to transfer to a hermaphrodite. Supported by R01-GM087705 and T32-GM007464.

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Program/Abstract # 356
Feeding and mating are required for ovarian development and egg production in the predaceous minute pirate bug *Orius pumilio*
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Female minute pirate bugs, *Orius pumilio* (Champion) require food and mating as adults to achieve maximum egg production. Last instar nymphs, isolated individually in single wells of 96-well microtiter plates, yielded low mortalities and assured virginity. Using morphological characters of these nymphs, correct sex identification was achieved with 96% accuracy. The availability of food (eggs of *Ephestia kuehniella* Zeller) and mates for these isolated females was conveniently controlled. Unfed adult females, whether mated or not, did not produce detectible yolk protein when assayed by ELISA, nor did they show any follicle development when examined microscopically. Fed but unmated females produced a significant, detectible amount of yolk protein, and some oocyte development was observed, but they contained no fully mature eggs. Females that were both fed and mated fell into two categories: 44% produced mature eggs at a mean rate of 6.4 eggs/female, while 56% had ovaries similar to those of fed but unmated females. We conclude that there is a two-stage process of egg development in adult female *O. pumilio*, in which early vitellogenesis depends on acquiring a nutritious adult diet, while completion of vitellogenesis and choriogenesis also requires mating. Unlike other Heteroptera, *O. pumilio* did not initiate vitellogenesis and yolk uptake under the influence of a juvenile hormone analog, indicating that juvenile hormone may not have a critical regulatory function in controlling egg production.

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Program/Abstract # 357
An ancient molecular circuit specifying multipotency
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Animal development requires a finely choreographed process of cell differentiation. Equally important, however, is the prevention of differentiation in stem cell lineages. Stem cells have various roles in the soma and also in the germ line, where they create sperm and eggs. In diverse species, many somatic and germ line functions are delegated to a single class of multipotent progenitor cells. The molecular control of these multipotent cells has remained largely unexplored. The sea urchin, an echinoderm, segregates multipotent cells in early embryogenesis that we hypothesize give rise to adult somatic tissues as well as the germ line. These cells possess gene expression homologous to multipotent progenitors and germ lines of multiple organisms, implying conservation of the molecular circuitry. We are determining the gene regulatory network (GRN) of sea urchin